

Prevalence of Gastro-intestinal Helminthiasis in Cattle of Madi Valley, Chitwan

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ABSTRACT

Cattle is one of the leading species of domestic livestock in Nepal. The helminthic diseases are common in livestock with varied occurrence. This study was carried out to find the prevalence and risk factor associated with gastro-intestinal helminth parasites in 304 fecal samples of cattle of Madi Valley, Chitwan, Nepal. Rectal sample were collected in zip lock plastic bag containing in 10% formalin and preserved in refrigerator before examination. Sedimentation and floatation techniques were used for the detection of helminth parasites. The overall prevalence of gastro-intestinal helminth was found to be 51.32%. The parasitic infection of trematode was 39%, cestode 13% and nematode 48%. In the trematode group, Fasciola sp. 4.61%, Paramphistomum sp. 15.13%, Dicrocoelium sp. 1.64%, Schistosoma sp. 0.66% and Bilharzia sp. 0.99% were prevalent. Among cestode, only Moniezia sp. was observed with infection rate of 7.89%. Nematode included Strongyloides sp. 3.95%, Trichostrongylus sp. 7.24%, Toxocara sp. 3.95%, Oesophagostomum sp. 1.97%, Haemonchus sp. 4.28%, Cooperia sp. 1.97%, Bunostomum sp 0.66%, Nematodirus sp 0.99% and others 3.29%. Mixed infections were observed in 17% of positive samples. Sex and age group showed statistically significant difference. Male have higher prevalence than that of female ($P < 0.05$). Potential risk factor like farmer's group, water source, body condition score, grazing and rearing system, purpose of animal rearing and last date of drenching showed significant association on prevalence of parasite. Cattle of Madi valley, Chitwan had shown wide range of helminthiasis in cattle.

Keywords: Cattle, Helminthiasis, Prevalence, Madi

INTRODUCTION

Livestock farming is an important agricultural sub-sector in Nepal (Khanna et al., 2022). Nepal has a population of 7.38 million cattle and 5.30 million buffalo (CBS, 2019) distributed over the country. Livestock farming act as the back bone of the Nepalese rural agriculture which maintain the livelihood of the 65% of the population (Chaudhary, 2018).

Parasitism is one of the major problems which reduce livestock productivity round the globe (Vercruyse & Claerebout, 2001). Gastro-intestinal helminth, has been the major cause for chronic illness and reduction of productive potential in cattle (Gunathilaka et al., 2018). Helminthes commonly infecting cattle includes trematode, cestode and nematode parasites (Bisset, 1994). These parasites infect the gastrointestinal tract and associated organs of ruminants with possibility to cause severe anemia (Holmes, 1987). The significance of helminths infection is increasing manifolds in developing countries (Rondelaud et al., 2001). The epidemiology of the disease is closely associated with environmental factor, temperature, humidity, rainfall and with the ecology and the infection status of the snail intermediate host, *Lymnaea* spp.

The reduction in feed intake and decrement of feed utilization due to associated parasitism cause the huge economic loss because of stunted weight gain, reduced milk production, low fertility, higher morbidity and associated effects (Jittapalapong et al., 2011). The control of helminthiasis in cattle revealed the positive milk yield response and lesser risk in zoonosis (Charlier et al., 2009).

The gastro-intestinal helminths, commonly found in cattle were identified as *Paramphistomum* sp., *Trichostrongyloid* sp., *Fasciola* sp., *Moniezia* sp., *Trichuris* sp., *Strongyloides* sp., *Taenia* sp., *Nimatodirus* sp., *Oesophagostomum* sp., *Toxocara* sp., *Bunostomum* sp., etc. (Ozidal et al., 2010; Jittapalapong et al., 2011; Farooq et al., 2012; Mahmuda et al., 2012). Within the Nepalese territory, wide varieties of helminth infections of fluke, tapeworms and roundworms are responsible for marked deleterious effects that tend to lower overall production due to morbidity and mortality (Mukhiya et al., 2007). The major endo-parasite in domestic animal causing severe economic problem in tropical climate of Chitwan, Nepal was found to be fluke infestation (Bista et al., 2018). Faciolosis, emerging zoonotic disease, in Nepal, has caused an overall economic loss of about 14.2 crore due to productivity loss in animals (Lohani & Rasaili, 1995). Jaiswal (2006) considered the *Fasciola* sp. as most important parasitic disease while Adhikari et al., (2003) reported *Paramphistomum* sp. caused serious illness.

Studies to determine the prevalence of intestinal parasites in cattle was not done in Madi valley yet. This study will be fruitful as it will give information regarding different

helminth parasites of cattle, a risk factor associated with gastro-intestinal helminth as well as update the previous findings on the prevalence of helminth parasites of cattle. This study will also form a base for the future investigators, those investigating the helminth related diseases of cattle.

MATERIALS AND METHODS

Study area

The study area, Madi is a municipality in Chitwan district of Nepal that lies in geographical coordinates of 27°27'5"N to 84°21'32"E. The study was based on laboratory testings after collection of samples on field level.

Sample Size

A total of 304 fecal samples of cattle of all age and sex group were collected from different area of Madi valley. During sample collection the precautions were taken to keep samples fresh, only rectal samples were collected in air tight container and fixed in 10% formalin. The questionnaire was used to collect information regarding various potential risk factors. Sample size was calculated with formulae given by Godden (2004) for infinite population (> 50,000).

$$SS = \frac{Z^2 (p)(1 - p)}{C^2}$$

Where, z=1.96 at the level of 95 % confidence level

P= expected prevalence previous prevalence is 26% (Sapkota et al., 2006)

C= desired prescription (0.05) at 95% confidence level

Fecal Examination

The fecal samples were collected, kept in preservatives and brought to laboratory and refrigerated. The fecal samples were examined by differential floatation technique (Juyal, 2003) and sedimentation technique (Soulsby, 1982).

Data analysis

The prevalence was calculated by dividing the number of samples showing positive for fecal examination by the total number of sample examined. Percentage (%) was used to measure prevalence. The data were entered in MS- Excel and analysis was done by SPSS Version 16. The chi – square test at 5% level of significance was used to evaluate statistically significance of the association of risk factors.

RESULTS

Out of 304 samples 156 (51.32%) were positive and the rest were negative for presence parasite's eggs on the fecal sample. Mixed infections were observed in 27 samples. The

parasitic infection of trematode was 86 (39%), cestode 28 (13%) and of nematode 86 (48%). The trematode identified with their prevalence percentage are as follows: *Fasciola* sp. 4.61%, *Paramphistomum* sp. 15.13%, *Dicrocoelium* sp. 1.64%, *Schistosoma* sp. 0.66% and *Bilharzia* sp. 0.99%. Among Cestode, only *Moniezia* species was observed with infection rate of 7.89%. Nematode included *Strongyloides* sp. 3.95%, *Trichostrongylus* sp. 7.24%, *Toxocara* sp. 3.95%, *Oesophagostomum* sp. 1.97%, *Haemonchus* sp. 4.28%, *Cooperia* sp. 1.97%, *Bunostomum* sp 0.66%, *Nematodirus* sp 0.99% and others 3.29% (Figure 1).

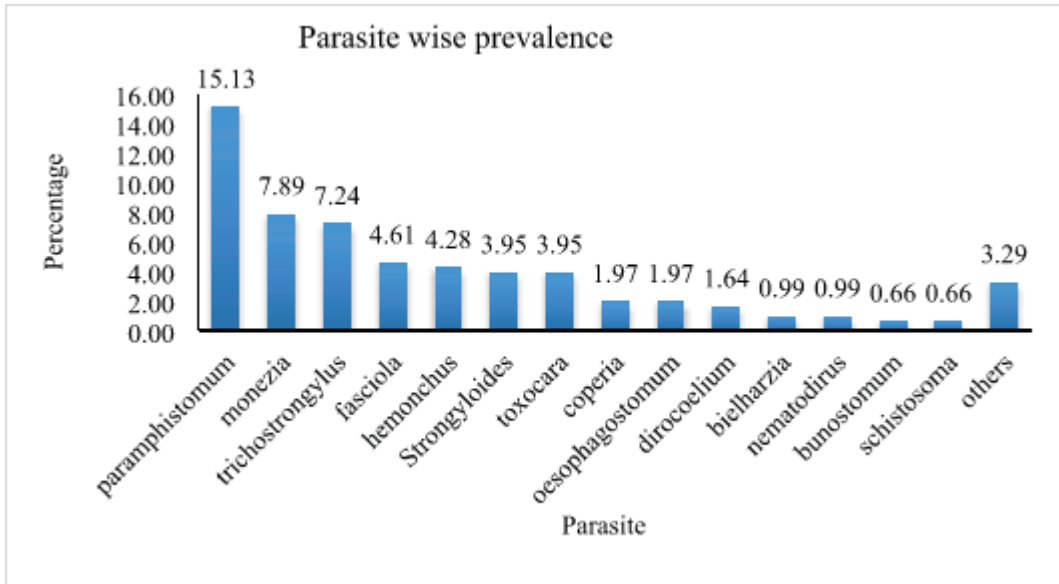


Figure 1. Bar diagram showing Parasite wise prevalence of parasites

All age group were affected as expressed in **Table 1**. Higher proportion in age group between 2 year to 4 year (58.12%), followed by below 2 year (57.5%) and age group above 4 year (38.46%) . Among the positive sample, (77/105) were male and (79/199) were females. Male have higher chance of getting infection then female (odd ratio=4.177). Prevalence in male (73.33%) then female (39.70%) is statically significant (**Table 2**).

Table 1: Age wise prevalence of parasite

Age group	Absent n (%)	Present n (%)	C h i - s q u a r e v a l u e	p- value	Remarks
Below 2 yrs	17 (42.5)	23 (57.5)	10.460	0.000	significant
2-4 yrs	67 (41.88)	93 (58.12)			
Above 4 yrs	64 (61.54)	40 (38.46)			

Table 2: Sex wise prevalence of parasite

	Result		Total	Chi-square value	Odd ratio	p value
	Positive N (%)	Negative N (%)				
Female	79 (39.7)	120 (60.3)	199	31.125	4.177	0.000** Significant
Male	77 (73.33)	28 (26.67)	105			

Table 3. Univariable analysis associated with detection of parasitic eggs

	Risk Factors		Positive N (%)	Negative N (%)	Total	Chi-square Test	Odd ratio	P-value	Remarks
1	Farmer's group	Upper caste	69 (40.12)	103 (59.88)	172	19.888	0.347	<0.001	Significant
		Lower caste	87 (65.91)	45 (34.09)	132				
2	Water source	Underground	76 (39.38)	117 (60.12)	193	30.152	0.252	<0.001	Significant
		Both (surface + underground)	80 (72.07)	31 (27.93)	111				
3	Body condition score	Good	26 (19.12)	110 (80.88)	136	1.021	14.47	<0.001	Significant
		Poor	130 (77.38)	38 (22.62)	168				
4	Feeding and grazing system	Stall only	70 (37.84)	115 (62.16)	185	34.364	4.281	<0.001	Significant
		Mix (stall + grazing)	86 (72.27)	33 (27.73)	119				
5	Purpose of animal use	Draft	53 (71.62)	21 (28.38)	74	25.186		<0.001	Significant
		Milk	41 (35.04)	76 (64.96)	117				
		Others	62 (54.87)	51 (45.13)	113				
6	Last date of drenching	Below 6 month	30 (27.25)	79 (72.75)	109	48.265	-	<0.001	significant
		6 -12 month	90 (73.17)	33 (26.83)	123				
		Above 12 month	36 (50)	36 (50)	72				

Figures in Parenthesis represents the percentage.

The risk factors (age, sex, rearing group, body condition score, water source, grazing and rearing system, last date of drenching, purpose of animal rearing) associated with parasitic infection were analyzed for the determine association of risks factor to the parasitic infection (**Table 3**). Lower cast group of ownres, Surface water as water sources of feeding, bad BCS, Draft animals, history of more than 6 mont of no drenching, are positively associated with presence of eggs of parasites on feces. All risk factors mentioned were seen to have significant effect on the parasitic infection ($p < 0.05$) at the 95 % level of significance.

DISCUSSION

The prevalence of helminth of this study i.e. 51% is similar to Pinilla Leon et al. (2019) that showed 56.3% prevalence in cattle and sheep in Columbia. Higher prevalence was seen in the cattle of the Surkhet district done by Parajuli (1993) and that of Shrestha (1996) where the prevalence rate was 75.91% in cattle of Kathmandu valley. Lower prevalence in lactating cattle and buffaloes of Kavrepalanchowk district i.e. 22% was found by Shrestha et al. (2020) and 41.6% in cattle of Ibadan, Nigeria by Adedipe et al. (2013). Prevalence of class wise parasite is similar to the Mukhia (2007) i.e. the prevalence of nematode, trematode and of cestode was 49.09%, 36.37% and 14.54% resp. in buffaloes brought to Kathmandu for slaughtering. Prevalence of nematodes is found to be lower as compared to the result demonstrated by Adedipe (2013) while overall prevalence was higher. This may be due to the low pathogenicity of nematodes in terms of Eggs Per Gram (EPG) than that of the trematode and cestode.

Higher prevalence of rumen fluke (28.41%) and lower prevalence of liver fluke (3.69%) than this study was obtained by Jittapalapong et al. (2011) in Thailand while contrasting result was found by Parajuli (1993) that prevalence of Fasciolosis and Paramphistomiasis were 42.2 % and 25.4 % respectively.

This study shows that the higher prevalence in age group between 2 to 4 year (58.12%), followed by below 2 years (57.5%) and age group above 4 years (38.46%) which is similar to findings of Gunathilaka et al. (2018) in Srilanka. Male have higher chance of getting infection than female (odd ratio=4.177). Prevalence in male (73.33%) then female (39.70%) is statically significant which is supported by Ameen et al. (2015) with higher prevalence in male than that of female in Nigeria whereas significant result with higher prevalence on female was obtain by pfukeniya et al. (2007) in Zimbabwe.

This result is supported by Muhammad et al. (2007) that higher prevalence in grazing animal than that of stall animals and using ponds and rivers/canals as drinking water were found to have significant influence ($P < 0.05$) on the prevalence in Toba Tek Singh district of Panjab, Pakistan. Female animals and animals with moderate body condition are more likely to be positive to helminth infection was found by Adedipe et.al, (2014) in Ibadan, Nigeria. Risk Factors like body condition and sex didn't show any effect on the prevalence of infections found by Aregay et.al, (2013) cattle of Ethiopia.

CONCLUSION

The study revealed gastrointestinal parasitism hazardous for dairy industry. This study identified *Paramphistomum* sp. *Moniezia* sp, *Trichostrongylus* sp. *Fasciola* sp were major species. Risk factor likes sex, age, farmer's group, water source, body condition score,

feeding system, use of animal and date of drenching had significant effect on prevalence of helminth parasite in cattle.

ACKNOWLEDGEMENT

The authors are highly thankful to Agriculture and Forestry University, Dr hari Bahadur Rana, Phd for his help to identification of parasites eggs. Parasitology lab staffs and National Cattle Research program (NCRP) staffs for their technical help in laboratory. We also thank all the cattle owners of Madi valley.

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